What is claimed is:

1. A wavelength division multiplexing passive optical network (WDM-PON) for performing bi-directional communication, the WDM-PON comprising:

two or more remote distribution nodes in between a central office and a first optical network unit, each remote distribution node located in a physically separate location and a first remote distribution node has two or more optical network units connected to the first remote distribution node, wherein each remote distribution node separates one or more wavelength channels from a composite optical signal distributed through that remote distribution node.

2. The WDM-PON of claim 1, further comprising:

a first remote distribution node having a series of band splitting filters configured to split a first composite optical signal that includes all of the wavelength channels in a first wavelength band into a first subset of the wavelength channels and a second subset of the wavelength channels.

3. The WDM-PON of claim 2, wherein the series of band splitting filters are also coupled together to create a second composite optical

signal in a second wavelength band by combining a first portion of the wavelength channels in the second wavelength band and a second portion of the wavelength channels in the second wavelength band, wherein the second composite optical signal travels in the opposite direction of the first composite optical signal and occupies a different wavelength band than the first composite optical signal.

4. The WDM-PON of claim 1, further comprising:

a second remote distribution node containing a first multiplexer/demultiplexer to receive a first subset of the wavelength channels in a first composite optical signal from the first remote distribution node and to send a first portion of wavelength channels in a second composite optical signal to the first remote distribution node, wherein the second composite optical signal occupies a different wavelength band than the first composite optical signal.

5. The WDM-PON of claim 4, wherein the second remote distribution node also contains a second multiplexer/demultiplexer to receive a second subset of the wavelength channels in the first composite optical signal from the first remote distribution node and to send a second subset of wavelength channels from the second wavelength band to the first remote distribution node.

6. The WDM-PON of claim 1, further comprising:

a first remote distribution node having an optical interleaver configured to split a first composite optical signal in a first wavelength band into a first portion consisting of odd numbered wavelength channels and a second portion consisting of odd numbered wavelength channels.

7. The WDM-PON of claim 6, wherein the optical interleaver is also configured to create a second composite optical signal in a second wavelength band from a combination of a first portion of wavelength channels in the second wavelength band and a second portion of wavelength channels in the second wavelength band.

8. The WDM-PON of claim 1, wherein the first remote distribution node includes an optical interleaver to receiving a downstream optical signal from the central office, divides the downstream signal into odd wavelength channel signals and even wavelength channel signals in order to output the odd and even wavelength signals to corresponding multiplexer/demultiplexers, and receives the odd and even wavelength channel signals from the corresponding multiplexer/demultiplexers in order to combine the odd wavelength channel signals with the even wavelength channel signals.

9. The WDM-PON of claim 6, further comprising:

a second remote distribution node containing a first multiplexer/demultiplexer to receive the odd numbered wavelength channels from the first remote distribution node and to send the first portion of the wavelength channels in a second wavelength band to the first remote distribution node.

10. The WDM-PON of claim 9, wherein the second remote distribution node also containing a second multiplexer/demultiplexer to receive the even numbered wavelength channels of the first wavelength band from the first remote distribution node and to send a portion of the second wavelength band to the first remote distribution node.

11. The WDM-PON of claim 1, further comprising

a first remote distribution node having a multiplexer/demultiplexer coupled to two or more band splitting filters configured to split a first composite optical signal that includes all of the wavelength channels in a first wavelength band into a first subset of wavelength channels and a second subset of wavelength channels.

12. The WDM-PON of claim 11, further comprising:

a second remote distribution node containing a first multiplexer/demultiplexer to receive the first subset of wavelength channels from the first remote distribution node, a second multiplexer/demultiplexer to receive the second subset of wavelength channels from the first remote distribution node.

13. The WDM-PON of claim 12, wherein the second remote distribution node to send a first through the fourth portions of the wavelength channels in a second wavelength band to the second multiplexer/demultiplexer in the first remote distribution node via the band splitting filters, wherein the second multiplexer/demultiplexer to combine the wavelength channels from the first through the fourth portions.

14. The WDM-PON of claim 11, further comprising:

a first band splitting filter to separate and couple a downstream and an upstream optical signal onto a first optical cable connected to the central office.

15. The WDM-PON of claim 1, wherein the first remote distribution node includes a first multiplexer/demultiplexer and a second remote distribution node includes an add drop module, wherein a first drop module removes a wavelength channel from a composite optical signal

that includes all of the wavelength channels and the first multiplexer/demultiplexer distributes two or more of the wavelength channels in the composite optical signal.

16. The WDM-PON of claim 1, further comprising:

two or more add/drop modules coupled to an optical fiber from the central office to the first remote distribution node containing a first multiplexer/demultiplexer, wherein the add/drop modules to remove wavelength channels from a downstream optical signal prior to the first multiplexer/demultiplexer.

17. A method, comprising

separating a first composite optical signal that includes all of the wavelength channels in a first wavelength band in a transmission path between a central office and a most distant optical network unit into two or more smaller groups consisting of subsets of the wavelength channels; and

generating the two or more smaller groups consisting of subsets of the wavelength channels by sequentially separating the first composite optical signal along the transmission path two or more times.

18. The method of claim 17, further comprising:

separating the composite optical signal into a first subset that includes even numbered wavelength channels and a second subset that includes odd numbered wavelength channels.

19. The method of claim 17, further comprising:

combining two or more optical signals in a second wavelength band along the transmission path, each optical signal with one or more wavelength channels, wherein a second composite optical signal travels in an opposite direction of the first composite optical signal and occupies a different wavelength band than the first composite optical signal.

20. An apparatus, comprising:

a first optical network unit including an optical receiver and an optical transmitter; and

means for separating a first composite optical signal that includes all of the wavelength channels in a first wavelength band into two or more smaller groups consisting of subsets of the wavelength channels in a transmission path between a central office and a first optical network unit, wherein the first composite optical signal is sequentially separated along the transmission path two or more times to generate the two or more smaller groups consisting of subsets of the wavelength channels.

21. The apparatus of claim 20, further comprising:

means for separating the composite optical signal into a first subset that includes even numbered wavelength channels and a second subset that includes odd numbered wavelength channels.

22. The apparatus of claim 20, further comprising:

means for combining two or more optical signals in a second wavelength band along the transmission path, each optical signal with one or more wavelength channels, wherein a second composite optical signal travels in an opposite direction of the first composite optical signal and occupies a different wavelength band than the first composite optical signal.